

इंटरनेट

मानक

Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 13667 (1993): Conductors for Electronics and Telecommunication Applications: Tinsel Conductors [LITD 6: Wires, Cables, Waveguides and Accessories]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”

BLANK PAGE



भारतीय मानक

चालन के लिये इलेक्ट्रानिकी और दूरसंचार अनुप्रयोगों की
विशिष्ट : टिन्सैल चालक

Indian Standard

CONDUCTORS FOR ELECTRONICS AND
TELECOMMUNICATION APPLICATIONS:
TINSEL CONDUCTORS — SPECIFICATION

UDC 621.315.55 [669.3.4.8] : 621.381.39.033

© BIS 1993

BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

April 1993

Price Group 1

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Wires and Cables for Electronic Equipment Sectional Committee had been approved by the Electronics and Telecommunication Division Council.

The most important requirement of tinsel conductor is its capability to withstand fatigue. This capability is a direct function of its tensile strength and rolled-in mechanical defects and metallurgical history. In addition to tensile strength, reverse bending test of the metallic ribbon gives a major indication of its fatigue strength.

Consideration has been given to those properties of metallic ribbon which have a direct bearing on fatigue strength. In this country, Type I and II of Tinsel Conductor specified in Table 1 of this specification are mostly in use. An additional variety designated as Type III has been specified in Table 1 which is mostly for use in flat cords, in line with practices in several other countries.

**AMENDMENT NO. 1 AUGUST 1999
TO
IS 13667 : 1993 CONDUCTORS FOR ELECTRONICS
AND TELECOMMUNICATION APPLICATIONS: TINSEL
CONDUCTORS — SPECIFICATION**

(Page 1, clause 4.3, para 4, line 3) — Substitute '1 meter' for 'inter'.

*(Page 1, clause 4.3, para 4, line 4) — Substitute '2°C' for '22°C' and
'minutes' for 'num'.*

*(Page 2, Table 1, col 3, row 3)— For Tinsel Type II, substitute value of DC
Resistance '1.15 ohm' for '0.15 ohm'.*

*(Page 2, Table 1, col 6, column heading) — Substitute 'Maximum'
for 'Approximate' and 'Conductor' for 'Thread'.*

(LTD 18)

Indian Standard

CONDUCTORS FOR ELECTRONICS AND TELECOMMUNICATION APPLICATIONS: TINSEL CONDUCTORS — SPECIFICATION

1 SCOPE

1.1 This standard covers the tinsel conductors for use in the manufacture of telephone and audio cords.

2 REFERENCES

1.2 The following Indian Standard is a necessary adjunct to this standard:

<i>IS No.</i>	<i>Title</i>
1885 (Part 32) : 1971	Electrotechnical vocabulary: Part 32 Cables, Conductors and accessories for electricity supply (superseding IS 1591 : 1960)

3 TERMINOLOGY

3.1 For the purpose of this standard, the definitions given in IS 1885 (Part 32) : 1971 shall apply.

4 CONDUCTOR

4.0 The conductors consist of tinsel threads produced by double lapping of high conductivity high strength copper alloy such as cadmium-copper alloy ribbons rolled from round solid wires, around synthetic yarn centres.

4.1 Requisite number of tinsel threads are strand/rope twisted with a twist to produce a conductor which shall meet the requirements specified in Table 1.

4.2 Tinsel Ribbon

It is a high conductivity high strength copper alloy ribbon which can be made by cold rolling of $0.08 \text{ mm} \pm 0.01 \text{ mm}$ dia metallic wire into a flat strip of uniform cross section. The ribbon can be $0.3 \pm 0.03 \text{ mm}$ wide and $0.025 \pm 0.005 \text{ mm}$ thick.

The cold rolled ribbon shall have uniform thickness and width and shall have bright and smooth surface and edges. The surfaces shall not show any crack when viewed under a magnifying glass of at least 10 X.

When specified in the relevant specification of the user, the ribbon may have a uniform coating of silver or tin. The metallic ribbon shall have a tensile strength of minimum 600 N/Sq mm.

The metallic ribbon shall withstand a minimum of 800 bends when tested in accordance with bend test as per 7.4.

4.3 Strand and Core Yarn — The nylon/polyester or similar yarn shall have twist in case of 2 or 3 ply yarns. The yarns used shall be free from any vegetable/sulfonated oils if used as lubricants.

Naturalness of strand of core and braid cables shall be checked by following method.

One gram of textile shall be added to 50 cc of freshly boiled distilled water in a flask of resistance glass. The flask contents shall be boiled gently for 30 minutes under reflux stopper and cooled.

The pH value of the water extract at room temperature shall be between 5.5 and 8.5. The yarn of inter length shall be kept in an oven at $140 \pm 22^\circ \text{C}$ for 15 mm and the shrinkage shall not exceed 5 percent for Type I and II and 3 percent for Type III applicable.

5 CONSTRUCTION

5.1 Tinsel Strand

Two metallic ribbon shall be evenly lapped in double layer about the synthetic ply yarn strand, with an average of 40 turns per 25 mm for each ribbon when measured over 150 mm length.

As a guidance, the first layer of the ribbon shall be flat against the strand yarn and second layer of ribbon shall be flat against the first layer of ribbon. Adjacent turns of each ribbon shall be flat and adjacent edges shall not touch or overlap.

5.2 Tinsel Wire

The requisite number of tinsel strands shall be evenly twisted with a lay of about 10 mm (for guidance only), and will meet the performance requirements specified in Table 1.

The finished conductor shall be quite limp and neutral and free from any tendency to drag, kink, spring or untwist.

Table 1
(*Clauses 4.1 and 5.2*)

Tinsel Type	Conductor Designation	DC Resistance	Breaking Load	Min No. of Strands	Approximate Diameter of the Thread
I	0.5/15	0.5 ohm/m	15 kg	7	1.0 mm
II	1.15/8	0.15 ohm	8 kg	4	0.8 mm
III	1.4/5	1.5 ohm	5 kg	3	0.7 mm

6 TESTS

6.1 The following tests shall be carried out as indicated against metallic ribbons, yarns and finished conductors.

- a) Metallic ribbons (Prior to lapping on yarns)
 - 1) Visual and dimensional check
 - 2) Breaking load
 - 3) Bend test
- b) Yarns
 - 1) Neutrality of water extract
 - 2) Shrinkage in heat test
- c) Finished conductor
 - 1) Visual and dimensional check
 - 2) Breaking load test
 - 3) Life test

7 METHODS OF TESTS

7.1 Visual and Dimensional Check

Ribbon, yarn and conductor shall be examined to verify that the dimension, constructions and workmanship are in accordance with the requirements of this standard. The examination and measurements shall be made on 5 meter length of flat ribbons on wire from a portion of the ribbon or wire after discarding 5 meters, length from the outside end of the spool.

7.2 Breaking Load

Breaking load of the ribbon or wire shall be determined on two specimens out of each sample unit. The tests shall be performed on ribbon or wire which has been carefully unwound and out, from a spool or reel, in length long enough to clamp in the testing-machine jaws when set 25 cm apart. Ribbon thus removed shall be reasonably flat before being placed in the testing machine. The rate of separation of jaws shall be not more than 7 cm per minute. The testing machine shall be of an accuracy such that the breaking load of a single ribbon or wire specimen can be measured to an accuracy of ± 2 percent. If fractures occurs at distance of less than 10 mm from either end of the jaws, the test shall be disregarded. In such cases additional specimens shall be tested from the same sample.

7.3 DC Resistance

Direct-current (dc) resistance of the ribbon or tinsel conductor shall be expressed as the average value of the resistance measured on two specimens out from each sample unit, using any standard method producing a resistance measurement to an accuracy of ± 1 percent.

The breaking load of the composite tinsel conductor shall also be expressed as above.

7.4 Bending

The number of bends the ribbon can withstand shall be determined as the average of the tests made on two specimens of suitable length cut from each sample. If the average falls below the specified requirement, the sample shall be wrapped atleast three times around a 1.0 mm diameter pin or its supporting shaft while the other end shall have a 50 gm weight attached and shall be allowed to hang free. The ribbon shall be flat on the pin and edges of the successive turns shall not touch or overlap. The pin, with its turns of ribbon shall be rotated on its long axis 90° in one direction and then 90° in the opposite direction continuously resulting in the ribbon being alternately wrapped and unwrapped one-fourth turn around the pin. One wrap and one unwrap shall together constitute a bend. The test shall be performed at the rate of 300 bends per minute.

7.5 Life Test

The finished conductor shall be required to meet the life test as per the following method:

A piece of conductor shall be gripped in chucks 22 mm apart which shall approach each other until they are 9.5 mm apart and then recede to their original positions, the movement being in a straight line and at a speed of 500 reciprocations per minute. The length of the conductor between the chucks when farthest apart shall allow 1.5 mm slack. The test shall continue for 4 00 000 reciprocations and shall be made on a total of not less than 240 threads. The number of threads fractured shall not exceed 5 percent. (A souble tape threads shall be considered fractured if either tape is broken,) The test shall be made on samples taken at random immediatly prior to covering.

Standard Mark

The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act, 1986* to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Revision of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Handbook' and 'Standards Monthly Additions'. Comments on this Indian Standard may be sent to BIS giving the following reference:

Doc : No. LTD 18 (1391)

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones : 331 01 31, 331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices :

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002

Eastern : 1/14 C. I. T. Scheme VII M, V I P. Road, Maniktola
CALCUTTA 700054

Northern : SCO 445-446, Sector 35-C, CHANDIGARH 160036

Southern : C. I. T. Campus, IV Cross Road, MADRAS 600113

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
BOMBAY 400093

Branches : AHMADABAD. BANGALORE. BHOPAL. BHUBANESHWAR. COIMBATORE.
FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. KANPUR
LUCKNOW. PATNA THIRUVANANTHAPURAM.

Telephone

{ 331 01 31
{ 331 13 75

{ 37 84 99, 37 85 61
{ 37 86 26, 37 86 62

{ 53 38 43, 53 16 40
{ 53 23 84

{ 235 02 16, 235 04 42
{ 235 15 19, 235 23 15

{ 632 92 95, 632 78 58
{ 632 78 91, 632 78 92